SUBSTITUTE CLAIMS

Claims

1. Drive circuit for brushless dc motors with a rotor and with a stator with stater coil, with a commutator device that feeds or interrupts power, specified moments of commutation, in a positive or negative direction, to the stator coil as a function of the rotor angle of rotation with a device to measure the motor speed, characterized in that a device (93) is provided for shifting the moments of commutation. according to phase argle, said device performs the shifting of the moments of commutation as a function of a current, measured motor speed according to a specified function.

2. Drive circuit for brushless dc motors with a rotor and with a stator that has at least one stator coil, with a commutation device that feeds current or interrupts current, in a positive or negative direction, to at least one stator coil as a function of the rotational position of the rotor, characterized in that a device (93) for shifting the moments of commutation according to phase angle is provided, where said device undertakes the shifting of the moments of commutation as e function of a preset, estimated or extrapolated motor speed according to a specified function.

3. Drive circuit according to Claims 3 or 2, characterized in that the device (93) pre-displaces the moments of commutation relative to the rotational position of the rotor, as a function of the preset or measured or extrapolated motor speed.

4. Drive circuit according to Claim 3, characterized in that the device (93) pre-displaces the moments of commutation by a specified, first electrical preignition angle with respect to the rotational position of the rotor, upon initial start-up of the rotor.

5. Drive circuit according to Claims 3 or 4, characterized in that the device (93) pre-displaces the moments of commutation after start-up, during the ramping of the motor, by a specified, second electrical preignition angle with respect to the rotational position of the motor, and that the second electrical preignition angle is smaller than the first electrical preignition angle.

6. Drive circuit according to Claims 1 to 5, characterized in that the device (93) pre-displaces the moments of commutation increasingly toward the rotational position or the rotor after a specified motor speed has been exceeded.

7. Drive circuit according to one of the preceding claims, characterized in that the device (93) for shifting of moments of commutation according to the phase angle, shifts the moment for turn-on of a motor current that is allocated to one commutation phase.

8. Drive circuit according to one of the preceding claims, characterized in that the device {93) for shifting the moments of commutation according to phase angle, shifts the moment for turn-off of a motor current that is allocated to one commutation phase.

9. Drive circuit according to one of the preceding claims, characterized in that the moment of commutations are shifted as a function of the motor speed according to a linear function.

10. Drive circuit according to one of the preceding claims, characterized in that the moment of commutations are shifted as a function of a nonlinear or unstable function.

11. Drive circuit according to one of the preceding claims, characterized in that the moment of commutations are shifted as a function of the motor speed according to a progressively rising function.

12. Drive circuit according to one of the preceding claims, characterized in that the moment of commutations are shifted as a function of the motor speed according to a predefined table or according to predefined memory values.

13. Drive circuit according to one of the preceding claims, characterized in that the drive circuit contains a power supply unit that feeds power to the stator of the brushless dc motor with a pulse train that has a speed-independent frequency of more than 5000 Hz, and whose individual pulses have a pulse duty factor of at least 0% and at most 100%.

14. Drive circuit according to one of the preceding claims, characterized in that the drive circuit contains a microprocessoror controller.

15. Drive circuit according to one of the preceding claims, characterized in that a speed control device for the motor is provided.

16. Drive circuit according to one of the preceding claims, characterized in that the motor speed is controlled as a function of a physical parameter, in particular a temperature.

17. Drive circuit according to one of the preceding claims, characterized in that a current measuring device is provided that ascertains the total motor current punctually at specified times.

18. Drive circuit according to one of the preceding claims, characterized in that at least one connection point is provided that is joined with one or more signal lines whose signals represent one or more temperature values.

19. Drive circuit according to one of the preceding claims, characterized in that at least one connection point is provided that is fed a digital signal that affects the speed of the motor.

20. Drive circuit according to one of the preceding claims, characterized in that a device is provided that produced an alarm signal when the motor is operated at below desired speed, or at overload.

21. Drive circuit according to Claim 20, characterized in that the alarm signal will be valid when it has a level between preset minimum and maximum values, or has at least one ac voltage component with a predefined frequency, amplitude or phase angle.

22. Drive circuit according to one of the preceding claims, characterized in that a device is provided for permanent monitoring of a temperature signal.

23. Drive circuit according to one of the preceding claims, characterized in that a device is provided to protect the motor against over-current or against overload during blocking.

24. Drive circuit according to one of the preceding claims, characterized in that a device is provided such that when it is activated, instead of a variable, preferably, temperature-sensitive speed value, a desired speed value of predetermined, fixed size is fed to the speed control device.

25. Drive circuit according to one of the preceding claims, with a start-up device consisting of a temperature-dependent resistor for the motor coil, to which an electronic or mechanical circuit is connected in parallel.

26. Drive circuit according to one of the preceding claims, characterized in that a magnetogalvanic commutation signal generator is provided that outputs a preshifted commutation signal according to phase angle, of about 1-50' (electric)of preshift, relative to a zero crossing of a reference signal, that will be induced when the rotor turns in a stator coil or several linked stator coils.

27. Drive circuit according to one of the preceding claims, characterized in that during the rotational motion of the rotor during one commutation phase, between two neighboring moments of commutation, the pulse duty factor of the individual pulses of the stator current will be changed continuously, where the individual pulses have a frequency of more than 5000Hz.

28. Drive circuit according to one of the preceding claims, characterized in that during the rotational motion of the rotor during one commutation phase, between two neighboring moments of commutation, the pulse duty factor of the individual pulses of the stator current will be changed in steps.

29. Drive circuit according to one of the preceding claims, characterized in that during the rotational motion of the rotor during one commutation phase, between two neighboring moments of commutation, the pulse duty factor of the individual pulses of the stator current will be switched to zero with a frequency of more than 5000 Hz, or the stator current will be shut off, after passage of about 95% of the amount of time of said commutation phase.

30. Drive circuit according to one of the preceding claims, characterized in that during the rotational motion of the rotor during one commutation phase, between two neighboring moments of commutation, the pulse duty factor of the single pulses will be limited according to a tabulated, stored or analytically defined function., i.e., it cannot be exceeded but may be understepped.

31. Drive circuit according to one of the preceding claims, characterized in that the speed control device for the motor is designed as a digitally operating PID controller whose sense intervals are reduced inversely proportional to the rising speed, and whose control coefficients are tracked according to rpm.